

V. SECTION E: SAMPLING AND TESTING THE WASTE

The purpose of the data requested below is to demonstrate that representative samples of the waste stream:

- a. Do not exhibit any of the criteria (e.g., hazardous waste characteristics or constituents) for which the waste was listed, and
- b. Do not exhibit any other criteria that could cause it to be listed.

Additional information is also requested as a check on the test results. Refer to the accompanying Guidance Manual for instructions on developing a sampling plan (Chapter 7), selecting proper test methods, (Chapter 8) and presenting the test results (Chapter 9).

V-1. General Information

- a. Name and address of the laboratory facility performing the sampling [260.22(i)(1)]:

Name Resource Engineering Inc.

Street 3000 Richmond Avenue

City Houston State Texas Zip 77098

Telephone: (713) 520-9900

Name Texas Department of Water Resources

Street P.O. Box 13087 Capitol Station

City Austin State Texas Zip 78711

Telephone: (512) 463-7898

For each individual person who (a) designed the sampling plan or (b) collected samples, please provide the following information and attach a resume or other statement of qualifications [260.22(i)(2)].

Name Dean Gore

Affiliation Resource Engineering Inc.

Title Senior Project Engineer

Name Darcy Ann Magee

Affiliation Resource Engineering Inc.

Title Geophysicist

Name John Brothers

Affiliation Resource Engineering Inc.

Title: Geologist

Name Texas Department of Water Resources

Affiliation Texas Dept. of Water Resources

b. Name and address of the laboratory facility performing the testing, if different from the sampling laboratory [260.22(i)(1)]:

Name Resource Engineering Laboratories Inc.

Street 3000 Richmond Avenue

City Houston State Texas Zip 77098

Telephone: (713) 520-9900

Name Southwest Laboratories

Street 222 Cavalcade

City Houston State Texas Zip 77009

Telephone: (713) 692-9151

Name Microbiological & Biochemical Assay Labs (MBA)

Street 340 S. 66th

City Houston State Texas Zip 77009

Telephone: (713) 928-2701

Name Southern Petroleum Laboratories, Inc.

Street 8880 Interchange

City Houston State Texas Zip 77054

Telephone: (713) 660-0901

Name Texas Department of Water Resources (TWC)

Street P.O. Box 13087 Capitol Station

City Austin State Texas Zip 78711

Telephone: (512) 463-7898

For each individual person who (a) designed the testing plan or (b) performed tests, please provide the following information and attach a resume or other statement of qualifications [260.22(i)(2)].

Name Bo Blankfield

Affiliation Resource Engineering, Inc., (REI)

Title Laboratory Director

Name Krishna Day

Affiliation Resource Engineering, Inc., (REI)

Title Laboratory Analyst

Name Joan Hoasl

Affiliation Resource Engineering, Inc., (REI)

Title Laboratory Supervisor

Name Jeff Barber

Affiliation Resource Engineering, Inc., (REI)

Title Laboratory Technician

Name Greg Maupin

Affiliation Resource Engineering, Inc., (REI)

Title Chemist

Name J.C. Winfrey

Affiliation Southern Petroleum Laboratories (SPL)

Title Director of Laboratory Services

Name Joe Kresse

Affiliation Microbiological & Biochemical Assay
Labs (MBA)

Title Laboratory Director

Name Mark Tipton

Affiliation Southwest Laboratories (SW)

Title Analytical Lab Supervisor

Name Texas Department of Water Resources

c. Describe the sampling strategy you followed to insure that the samples were representative [260.22(i)(8)]. Please address specifically:

- o the variation of the waste stream over time; and

- o the variation of the waste stream in space.

All waste stream outflows or storage locations to which this petition applies must be sampled. The Delisting Petition Guidance Manual (see Instructions to this form) gives directions for developing a sampling plan.

This petition seeks to exclude from regulation on a one time basis, soil that was in contact with EPA Hazardous Waste No. K001. During closure activities in October 1984, 286 cubic yards of sludge and soil were removed from the two oxidation ponds. The soil that remains is the subject of this delisting petition.

The primary objective of the sampling strategy was to achieve sampling accuracy and sampling precision. The sampling involved only the soil that was in contact with the listed hazardous waste. To achieve the greatest degree of representativeness, the variation of the once overlying waste stream with respect to time and space was considered and incorporated into the sampling strategy.

Each batch of waste was completely homogenous with regard to the chemical properties of concern and that chemical homogeneity is constant (uniform) over time (from batch to batch). Therefore a single sample collected from the waste at an arbitrary location and time would theoretically generate an accurate and precise estimate of the chemical properties.

The waste stream entered the pond at the location shown on Figure 2A. It travelled from the aeration area of the waste treatment unit via 6" schedule 40 PVC pipe. Therefore, only the deposition of the waste stream might be expected to vary in (horizontal) space. With respect to the soils that were in contact with the bottom sediment sludge, the same conclusion can be drawn -- no variability through time and possible variability through space. To collect representative samples (e.g., samples that exhibit average properties of the entire soil) that would allow sufficiently accurate and precise measurement of the chemical properties of the soil, the method of probability sampling as described in EPA Document SW-846 "Test Methods for Evaluating Solid Waste" was utilized.

Sampling and analysis for the four hazardous waste characteristics (e.g., corrosivity, reactivity, EP Toxicity, ignitability), Total Organic Carbon, and oil and grease was conducted by Resource Engineering, Inc. in April, 1986 using the simple random sampling method described in EPA Document SW-846. As illustrated in Figure 2-B, the oxidation pond was divided into a ten by ten grid and numbered

1 through 10 on each axis. The grab sample points were then selected by generating a two-digit random number using the Random Number Generator Mode on the Hewlett-Packard 15C calculator and locating the grid intersections whose coordinates corresponded to each of the two digit random numbers. These intersections are the locations of the randomly selected sampling points. The samples were collected using a modified triar. The triar was inserted into the soil 0 to 45° from horizontal. The triar was rotated to cut a core of the soil. The triar was then removed with the concave side up and the soil transferred to a stainless steel mixing container. The grab samples were combined and mixed well to form a homogeneous composite sample.

The soil sample was composited into six glass containers with screw tight lids. Immediately after the samples were collected, they were preserved by storing at 4°C, in accordance with EPA Publication SW-846, Preservation Procedures. They were then delivered to the laboratory listed above within 18 hours of collection.

The sampling procedures were documented in three stages to ensure the integrity of the sample. Each container was secured with an indelible label that contained the following information: name of collector and location of collection, date and time of sampling, sample identification number, and the analysis to be performed. The second stage in the documentation effort, the chain-of-custody report, was completed according to the instructions in SW-846 1.3.1 - 1.3.4. As seen in Figure 3, the format provides a description of the analysis requested, thereby fulfilling the third stage in the documentation effort -- the sample analysis request sheet. A field log book was kept which documents the sampling procedures described above. Laboratory analyses are summarized in Section D-1. See Attachment 2.

Sampling and analysis of the appropriate leachate tests were conducted by Resource Engineering, Inc. in October, 1985 repeating the TDWR locations described below. The same handling, preservation, and documentation procedures as described above were followed. Composite samples of soil from the impoundment bottom were taken from each of the four quadrants shown in Figure 2-A, using a stainless steel scoop according to EPA SW-846,

RESOURCE ENGINEERING - ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

PROJECT NO.			PROJECT NAME					LOCATION				
FIELD SAMPLE NUMBER	DATE	TIME	GRAB	COMP.	SAMPLE CONTAINER (SIZE/MAT'L)	SAMPLE TYPE (LIQUID, SLUDGE, ETC.)	PRESER- VATIVE	ANALYSIS REQUESTED	COMMENTS AND HOLD STORAGE DATE			
LAB SAMPLE NO.			REMARKS						SAMPLER SIGNATURE			
RELINQUISHED BY (SIGNATURE)		DATE	TIME	RECEIVED BY (SIGNATURE)			RELINQUISHED BY (SIGNATURE)		DATE	TIME	RECEIVED BY (SIGNATURE)	
RELINQUISHED BY (SIGNATURE)		DATE	TIME	RECEIVED BY (SIGNATURE)			RELINQUISHED BY (SIGNATURE)		DATE	TIME	RECEIVED BY (SIGNATURE)	
RELINQUISHED BY (SIGNATURE)		DATE	TIME	RECEIVED BY (SIGNATURE)			RELINQUISHED BY (SIGNATURE)		DATE	TIME	RECEIVED BY (SIGNATURE)	

FIGURE 3

PROJECT NO.

1.2.1.7. Soil samples from 0-6 inches in depth were taken at each of the sampling locations shown. Samples from each quadrant were then composited in the field in stainless steel compositing bowls before transporting them to the laboratory for analysis. The four composite samples were subjected to the Texas Department of Water Resources (TDWR) extraction procedure described in the TDWR technical Guidance Document #1 - Waste Evaluation/Classification in quadruplicate (see Attachment 4). The leachate from the extraction procedure was then analyzed for polynuclear aromatic hydrocarbons. The results of these analysis yielded non-detectable concentrations from all samples (see Attachment 1).

Sampling and analysis for the total concentration of the specific hazardous constituents for which the waste was listed was conducted by the TDWR (now Texas Water Commission) in August, 1984. Procedures established by this regulatory commission concerning sampling, documentation, analysis, and quality control were followed. Following TDWR sampling procedures, composite samples of soil from the impoundment bottom were taken from each of the four quadrants shown in Figure 2A. (Note: The sampling locations indicated on Figure 2A were staked and the

same locations were sampled in the sampling efforts described above for the leachate tests). The results of these analysis are summarized in Table 1. These results were provided by the Texas Department of Water Resources. They did not provide quality control/quality assurance data with the results.

Table 1
Lufkin Creosoting Pit
Soil Samples

<u>Analytical Parameter</u>	<u>Comp 1 PPM</u>	<u>Comp 2 PPM</u>	<u>Comp 3 PPM</u>	<u>Comp 4 PPM</u>
Fluoranthene	11	7.5	4.1	1.2
Benzo(b)fluoranthene	2.4	1.2	1.4	3.0
Benzo(a)pyrene	1.2	1.2	0.39	1.4
Indeno(1,2,3-c,d)pyrene	0.33	0.33	0.14	0.43
Benzo(a)anthracene	2.3	1.2	1.3	
Dibenzo(a,h)anthracene	0.17	0.17	trace	0.23
Acenapthene	6.6	6.6	0.66	2.9
Naphthalene	0.15	0.15	0.04	0.03
Chrysene	1.9	1.9	1.5	1.9

Sampling and analysis for phenolics was conducted in June, 1984. Again, sampling locations were chosen using probability sampling techniques. Sample handling, preservation, and documentation was performed as described above to ensure the integrity of the sample. Four soil borings were advanced using a Shelby tube according to American Society of Testing Methods (ASTM) procedures. Boring 1 was made through undisturbed soils on the plant site. It was sampled continuously from the surface to 10 feet below grade. The boring was continued to 13 feet and a final sample taken reaching 15 feet below grade. Soils in this boring were generally silty sands. Borings 2, 3, and 4 were made through the oxidation pond and into undisturbed soils. (For details of the subsurface soils, see the Subsurface Exploration Records in Attachment 3). Sampling locations and laboratory analysis for phenolics are summarized in Table 2 (see Attachment 2). Following the drilling, soil sampling, and completion of Boring 1, this boring was converted to a 2" (inside diameter) monitor well - Monitor Well No. 1. The well was constructed of schedule 40 PVC pipe, and was screened from 13.5 to 6.5 feet below grade using a size 0.010 inch opening screen. The completion record for this

well is presented in Attachment 14. The well had a very low rate of water production estimated at less than one (1) gallon per minute.

Groundwater from the well was sampled and analyzed for phenolics. Results of this analysis is summarized in Table 3. Groundwater from the well was sampled and analyzed for total PAH concentration on three separate occasions; in June 1984, September 1985, and in April 1986. Results of these analyses are summarized in Table 4 (see Attachment 13). Samples were obtained from the monitor well by means of a Teflon bailer in accordance with the recommended procedures described in: "A Guide to the Selection of Materials for Monitoring Well Construction and Groundwater Sampling", Michael Barcelona, James Gibb, and Robin Miller, U.S. EPA Contract No. EPA CR-809966-01, August 1983. Sample handling, preservation, and documentation were performed as described above.

Table 2
Phenolics Concentrations in Soils

<u>Sample No.</u>	<u>Depth Below Grade (ft)</u>	<u>Phenolics Concentration (mg/kg)</u>
1-1	0 - 2	<0.12
1-2	2 - 4	<0.12
1-3	4 - 6	<0.12
1-4	6 - 8	<0.12
1-5	8 - 10	<0.12
1-6	13 - 15	<0.12
2-1	0 - 2	<0.12
2-2	2 - 4	<0.12
2-3	4 - 6	<0.12
2-4	6 - 8	<0.12
2-5	8 - 10	<0.12
3-1	2.5 - 4	<0.12
3-1B	2.5 - 4	<0.12
3-2	4 - 5.5	<0.12
4-1	3.5 - 5	<0.12
4-2A	5 - 6.5	<0.12
4-2B	5 - 6.5	<0.12

TABLE 3
PHENOLICS CONCENTRATION IN GROUNDWATER

<u>Sample</u>	<u>Phenolics Concentrations (mg/L)</u>
Monitor Well No. 1	<0.03

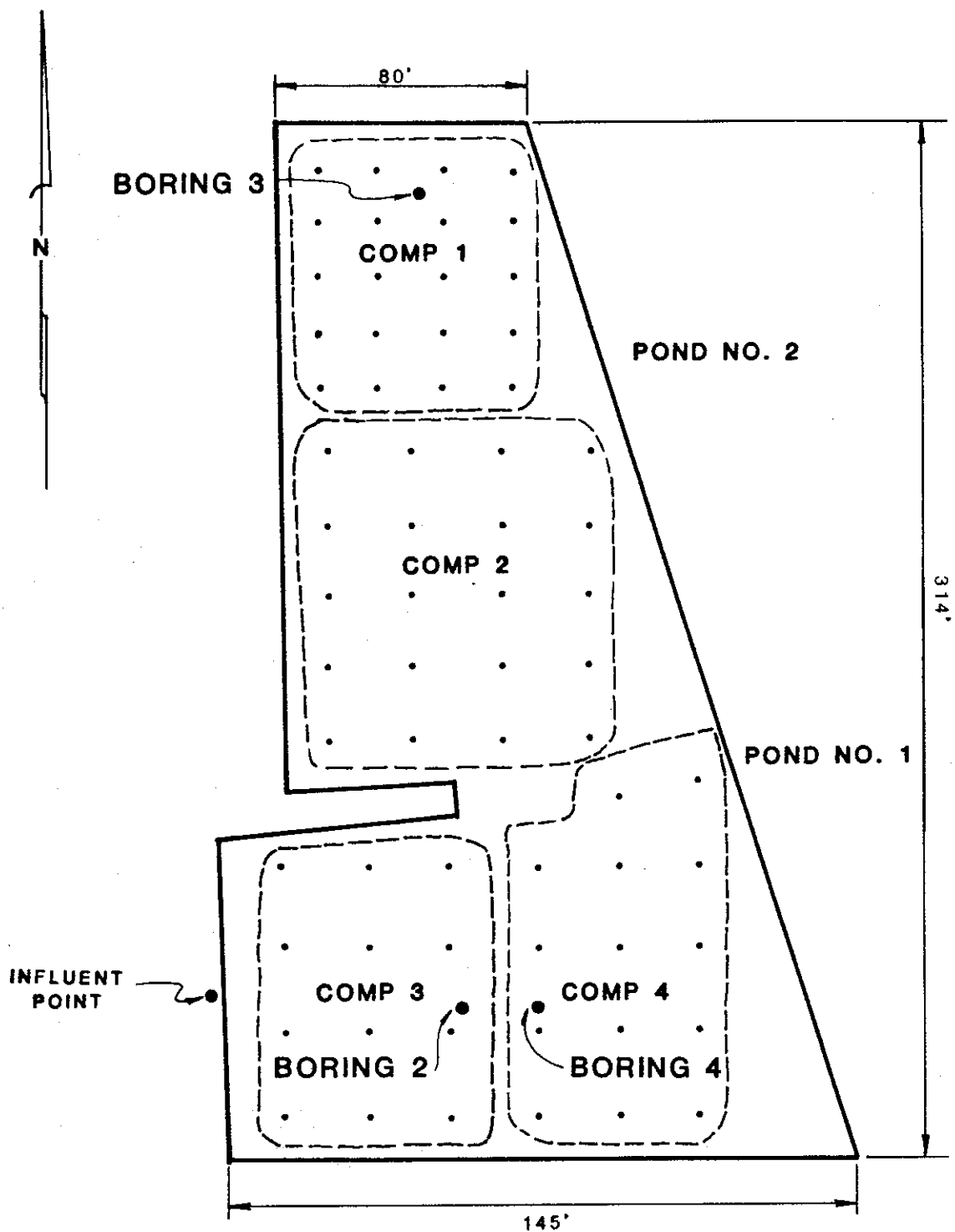
TABLE 4
POLYNUCLEAR AROMATIC HYDROCARBON CONCENTRATION IN
GROUNDWATER - MONITOR WELL NO. 1

<u>Compound</u>	<u>PAH Concentration (ppm)</u>		
	<u>June</u> <u>1984</u>	<u>September</u> <u>1985</u>	<u>April</u> <u>1986</u>
Naphthalene	ND	ND	ND
Acenaphthylene	ND	ND	ND
Acenaphthene	ND	ND	ND
Fluoranthene	ND	ND	ND
Anthracene	ND	ND	ND
Phenanthrene	ND	ND	ND
Pyrene	ND	ND	ND
Chrysene	ND	ND	ND
Benzo (b) anthracene	ND	ND	ND
Benzo (a) anthracene	ND	ND	ND
Benzo (k) fluoranthene	ND	ND	ND
Benzo (a) pyrene	ND	ND	ND
Indeno (1,2,3 -c,d) pyrene	ND	ND	ND
Dibenzo (a,h) anthracene	ND	ND	ND
Benzo (g,h,i) perylenedioxin	ND	ND	ND

*ND - not detected or below 0.01/ppm

- d. State whether the Chain of Custody procedures in Section 1.3 of SW-846 were followed. Please describe any deviations from those procedures and the reasons for them.

As described in C above, the Chain-of-Custody procedures in Section 1.3 of SW-846 were followed. There were slight deviations from the procedures and those deviations are described. With reference to Section 1.3.2 - Sample Seals, paper seals with the listed information were not used. Instead, the sample labels and lid tops were taped over with clear tape. This type of seal achieved the same goal as the listed sample seal, i.e., it was attached in such a way that it was necessary to break it in order to open the sample container. The only other deviation was with respect to Section 1.3.5 - Sample Analysis Request Sheet. The Chain-of-Custody form illustrated in Figure 3 includes a description of the analysis requested, therefore eliminating the need for a separate sample analysis request sheet. All other procedures in Section 1.3 of EPA Document SW-846 were followed.



BORING 1.



RESOURCE ENGINEERING INC.

ENVIRONMENTAL CONSULTANTS
HOUSTON, TEXAS

FIGURE 2A
SAMPLING LOCATIONS

DRAWN BY: L.C.S.

DATE: 5/1/86

PROJECT NO.

V-2 Sample-Specific Information

For each individual sample, please furnish the information requested in the form on the following page. The notes below refer to those items on the form that are not self-explanatory. The Guidance Manual contains additional instructions.

NOTES

Sources for test methods are footnoted as follows:

- 1 "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods," EPA SW-846 (2nd edition), July 1982, and supplements.
- 2 "Methods for the Evaluationn of Water and Wastewater," EPA 600 14-79-020, March 1979.
- 3 "Standard Methods for the Examination of Water and Wastewater," (15th edition).
- 4 Appendix J of the Delisting Guidance Manual.

See Attachment 11

V-3 Summary Table of Analytical Results

For each sample, please enter the Test Results from Item 2 above onto the form contained in the following pages.

See Attachment 12

V-4 Analytical Discussion

Please furnish explanations or additional information on the following topics as necessary:

- a. Inconsistencies or deviations in the analytical results presented above.

No inconsistencies or deviations present.

- b. Additional reasons as to why the waste stream should be delisted.

This petition seeks to delist on a one time basis a specific volume of soil that was in contact with a listed hazardous waste, but itself is nonhazardous as defined by 40 CFR 261. In accordance with 40 CFR 260.20, this petition has demonstrated that the waste does not exhibit any of the hazardous waste characteristics and does not contain any other toxicants at hazardous levels. In addition, in fulfillment of the requirements of 40 CFR 260.20, it can be demonstrated, according to 260.22(d) that the waste does not meet the

criterion of 261.11(a)(3) when considering the factors in 261.11(a)(3),(i) through (xi).

According to 261.11(a)(3) of 40 CFR Subpart B, the Administrator shall list a solid waste as a hazardous waste only upon determining that the solid waste meets one of the following criteria:

- (1) It exhibits any of the characteristics of a hazardous waste identified in Subpart C.

(NOTE: The characteristics of a hazardous waste: ignitability, corrosivity, EP Toxicity, and reactivity have already been discussed).

- (2) A waste that fulfills the criteria of an acute hazardous waste.

(Note: Neither the waste nor the soil that was in contact with the waste fulfill the criteria of an acute hazardous waste).

(3) It contains any of the toxic constituents listed in Appendix VIII unless, after considering any of the following factors, the Administration concludes that the waste is not capable of posing a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed:

- (i) The nature of the toxicity presented by the constituents.
- (ii) The concentration of the constituent in the waste.
- (iii) The potential of the constituent or any toxic degradation product of the constituent to migrate from the waste into the environment under improper management.
- (iv) The persistence of the constituent or any toxic degradation product of the constituent.

- (v) The potential for the constituent or any toxic degradation product of the constituent to degrade into non-harmful constituents and the rate of degradation.
- (vi) The degree to which the constituent or any degradation product of the constituent bioaccumulates in ecosystems.
- (vii) The plausible types of improper management to which the waste could be subjected.
- (viii) The quantities of the waste generated at individual generation sites or on a regional or national basis.
- (ix) The nature and severity of the human health and environmental damage that has occurred as a result of the improper management of wastes containing the constituent.

(x) Action taken by other governmental agencies or regulatory programs based on the health or environmental hazard posed by the waste or waste constituent.

(xi) Such other factors as may be appropriate.

The soil that was in contact with the listed waste contains trace amounts of the following toxic constituents listed in Appendix VIII; fluoranthene, benzo(b) fluoranthene, benzo(a) pyrene, indeno (1,2,3-c,d) pyrene, benzo(a) anthracene, dibenzo(a,h) anthracene, acenaphthene, naphthalene and chrysene.

With reference to (i) through (iii) listed above;

(i) The nature of the toxicity presented by the constituents.

- (ii) The concentration of the constituent in the waste.
- (iii) The potential of the constituent or any toxic degradation product of the constituent to migrate from the waste into the environment under improper management;

These compounds are considered hazardous because in large quantities, they are considered toxic and some are considered human carcinogens.

When considering the toxicity of hazardous constituents, the acute toxicity is that which is generally considered to be the indicator of a constituent's hazardousness. Of the PAH constituents of concern at the Lufkin Creosoting site, only three have published LD₅₀ data. Table 3 lists these three constituents and their LD₅₀'s as well as their peak concentration as found at the Lufkin

Creosoting site. This data is used in Finney's joint additive toxicity model to yield a calculated LD₅₀ for the soil in the bottom of the impoundment. Although not directly applicable to EPA Federal regulations, the Texas Water Commission considers a calculated LD₅₀ below 500 milligrams per kilogram to be considered a Class I waste based on toxicity. A calculated LD₅₀ greater than 500 milligrams per kilogram is considered a Class II waste.

Table 3
Toxicity Calculations

	<u>LD₅₀ (rat)</u> <u>(mg/kg)</u>	<u>Concentration</u> <u>(mg/kg)</u>
Fluoranthene	2000	11
Benzo(a)pyrene	50	1.4
Dibenzo(a,h)anthracene	660 (muskrat)	0.23

	<u>Fluoranthene</u>	<u>Benzo(A)pyrene</u>	<u>Dibenzo(A,H)anthracene</u>
X_i/TOX_i	5.5×10^{-9}	2.8×10^{-8}	3.5×10^{-10}

$$LD_{50} = \text{inverse } \frac{X_i}{TOX_i} = \underline{29,542,098 \text{ mg/kg}}$$

As shown by Table 3, the calculated LD₅₀ for the soils at the Lufkin Creosoting site based on the three constituents for which LD₅₀ data could be gathered is 29,542,098 milligrams per kilogram. This concentration is 5 orders of magnitude greater than the 500 milligrams per kilogram criteria used by the Texas Water Commission to classify a Class I waste. Based on this information, it can be shown that due to the low concentrations of the constituents in the soils, these soils do not pose a threat to human health or the environment due to their toxicity. In further support of this conclusion, although only three compounds were used in the LD₅₀ calculations, one of these three, fluoranthene, was found in higher concentrations in the soil than any of the other constituents.

The second and more important of the two listing criteria for the PAH constituents is their potential carcinogenicity. Of the nine constituents of concern, five are considered to be human or animal carcinogens. Those compounds are:

Benzo(a)anthracene

Benzo(b)fluoranthene

Benzo(a)pyrene

Chrysene

Dibenzo(a,h)anthracene

The Environmental Protection Agency uses a 10^{-5} cancer risk as its criteria for determining a compound's potential carcinogenicity. The carcinogenicity of PAH's as a class of compounds is discussed in detail in the EPA publication "Ambient Water Quality Criteria for Polynuclear Aromatic Hydrocarbons." This document, published in October of 1980, discusses the development of

ambient water quality limits for polynuclear aromatic hydrocarbons. As discussed in the document, almost all of the research on the carcinogenicity of PAH's has been done on the compound Benzo(a)pyrene. In fact, the basis for the development of the Ambient Water Quality Criteria is experiments reported by Neal and Rigdon in 1967, in which Benzo(a)Pyrene at doses ranging between 1 and 250 parts per million in the diet was fed to strain CFW mice for approximately 110 days. Based on the results from these experiments, the carcinogenic potency factor in humans for Benzo(a)pyrene was calculated to be 11.53 milligrams per kilogram per day. It is further stated in this document that "there is probably little need to derive criteria for all such PAH, since such efforts to reduce Benzo(a)pyrene levels to within acceptable limits will result in the reduction of all PAH." Comparing this criteria to the

concentrations of Benzo(a)pyrene at the Lufkin Creosoting Site, we find that the Benzo(a)Pyrene concentration in all composite samples is well below that criteria.

The peak concentrations of the five carcinogenic PAHs found at the Lufkin Creosoting Site are as follows:

Benzo(a)anthracene	2.3 ppm
Benzo(b)flouranthene	3.0 ppm
Benzo(a)pyrene	1.4 ppm
Chrysene	1.9 ppm
Dibenzo(a,h)anthracene	0.23 ppm

When these peak concentrations are added together, they total 8.83 parts per million. This additive peak concentration is well below the 11.53 criteria listed in the ambient water quality document as being below 10^{-5} cancer risk to humans. Therefore, the concentrations of the PAH's existing at the Lufkin Creosoting site are at a

level which is below the concentration that would pose a threat to human health via either acute toxicity or carcinogenicity by two routes of exposure - dietary intake of soil and water.

Samples taken in October of 1985 were subjected to the TDWR leachate test and then analyzed for the nine PAH's of concern. These results are shown in detail in Attachment A.

The data resulting from this test enables us to quantify the potential for the PAH's to dissolve into water, or leach, and thereby act as an indicator of the potential of the PAH constituents to migrate to ground or surface water. As can be seen by these results, the potential for the PAH constituents to dissolve into water and thereby to migrate is zero as evidenced by the fact that none of the compounds were detected in the leachate.

With reference to (iv) through (vi) above concerning the persistence, rate of biodegradation and rate of bioaccumulation of the listed constituents and any toxic degradation product, studies indicate variability of these factors across the PAH chemical group. Detailed studies on the persistence of PAH's, and the biodegradation and bioaccumulation rates are reviewed in Attachment 5 - Attachment 7 below. These tables present the polycyclic aromatic hydrocarbons in three groups according to materials balance, chemical properties related to fate and environmental pathways, and health effects.

The first group contains only naphthalene (Attachment 5). Naphthalene is significantly more volatile and more water soluble than any other PAH. The second group (Attachment 6) contains anthracene, acenaphthene, fluorene, fluoranthene,

phenanthrene, and pyrene. Of this group, fluoranthene is the only PAH of concern to this petition. These compounds are three- and four-ring PAH's, with moderately low volatility and water solubility. Much of the information regarding this group is specific to anthracene. The third group (Attachment 7) consists of benzo(a)pyrene, acenaphthylene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, and indeno(1,2,3,-c,d)pyrene. With one exception (acenaphthylene), the chemicals in this group have very low vapor pressures and water solubilities. Much of the information regarding this group is specific to benzo (a)pyrene. The half-lives of these three groups in sediments are expected to be on the order of a few years¹ and the rates of bioaccumu-

¹White, J.B. Vanderslice, R.R. POM Source and Ambient Concentration Data: Review and Analysis. Research Triangle Park, NC: USEPA; 1980.

lation and biodegradation are variable, as indicated in the tables below.

With reference to (vii) and (ix) above, there are no plausible types of improper management to which the waste could be subject. As discussed in detail in Section C, the subject of this petition is the soil that was once in contact with the listed waste. No human health or environmental damage has occurred as a result of improper management of the waste.

With reference to (x) through (xi) above;

- (x) Action taken by other governmental agencies or regulatory programs based on the health or environmental hazard posed by the waste or waste constituent.

(xi) Such other factors as may be appropriate;

The soil that was in contact with the listed waste contains trace amounts of the following toxic constituents listed in Appendix VIII; fluoranthene, benzo(b) fluoranthene, benzo(a) pyrene, indeno (1,2,3-c,d) pyrene, benzo(a) anthracene, dibenzo(a,h) anthracene, acenaphthene, naphthalene and chrysene.

In a memorandum from the Acting Director of the Office of Health Assessment, Stephen Margolis Ph.D. to Mr. Carl R. Hickam, Public Health Advisor, EPA Region VI (see Attachment 8), Dr. Margolis recommends that "Polynuclear Aromatic Hydrocarbon (PAH) concentrations in residential soil less than 100 ppm should present no significant acute or chronic health threat to human health through any normal route of exposure".

EPA Region VI reviewed a July 31, 1985 Superfund Implementation Group's memorandum evaluating the potential health hazard presented by the chemical contamination at the United Creosote Site. They requested assistance in developing a design value for the planned cleanup of the site.

Dr. Margolis reviewed the documents listed in Attachment 8 and considered the principle contaminants and the exposure pathways. His modeling efforts can be compared with the parameters at Lufkin except that

- (a) pentachlorophenol is not and has never been used at Lufkin Creosote; and
- (b) the groundwater is not contaminated.

The same conclusion can be reached; that a value of 100 ppm for total PAH in surficial residential soil is a

value that is unlikely to result in a public health risk. This level is well above the total PAH concentration of 17.18 ppm found at Lufkin Creosoting Co. The author states that his model very likely overestimates the total lifetime soil ingestion exposure by at least one order of magnitude. Also, the model contains a factor to account for the environmental degradation of the specific chemical. "While the numerous PAH's have a range of half-life values in surface soil, which will be dependent upon the specific soil and climatological conditions encountered, even the maximum half-life for the most degradation-resistant compound is less than the value assigned in the model. Thus, considering only these two areas for modifications to the model, it can be seen that a residue of 100 ppm of PAH's in soil is not likely to present a significant human health hazard."

Other action taken by a government agency was an EPA, Region VI, RCRA Compliance Monitoring Inspection conducted on April 8, 1986 by Mr. Peter Nethercut. The inspection report (reproduced in Attachment 15) summarizes Lufkin Creosoting as "an example of how a wood creosoting operation should be run." The attachment to the generators checklist states that "Lufkin Creosoting reclaims 30 to 50 gallons per day of almost pure creosote, which is done by keeping the process as clean as possible. By reducing the amount of contaminants introduced to the retorts, the contamination of the creosote is reduced." It is the opinion of the inspector that the surface impoundment (the remaining soils of which are the subject of this petition), does not present any risk to human health or the environment.

V-5 Quality Assurance and Quality Control

- a. For inorganic substances, describe the procedures used for Standard Additions Analysis. Standard Methods of Additions Procedures were followed. See Attachment 1 and 2.
- b. For organic substances, describe the procedures used for analysis of spiked samples. For each substance tested, provide the information requested in the following table. Also, describe in writing the procedures used to calibrate the analytical equipment. See Attachment 1 and 2.
- c. Describe any other QA/QC measures followed in regard to the sampling and analysis procedures.

The quality control/quality assurance measures described in EPA Document SW-846 were followed as described. With reference to Section 10.3, sampling, the sample plan, collection, preservation and chain-of-custody procedures were followed according to RCRA criteria. Standard operating procedures used in the waste analysis are indicated in Attachments 1 and 2.